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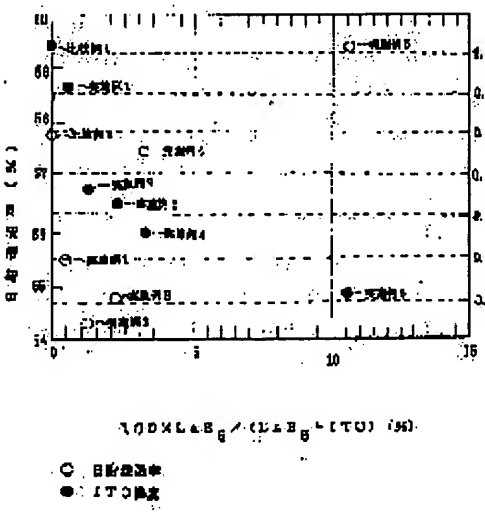
(54) SUNLIGHT SHIELDING LAMINATED GLASS



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a sunlight shielding laminated glass improved in sunlight shielding function and having high transmissive performance to visible ray region.

SOLUTION: The sunlight shielding laminated glass is formed by interposing an intermediate layer having the sunlight shielding function between 2 glass sheets. The intermediate layers is formed from an intermediate film composed of an adding liquid, which is prepared by dispersing at least one kind of hexaborate fine particle selected from a group composed of LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, LuB6, (La, Ce)B6, SrB6 and CaB6 and if necessary, ITO fine particle and/or ATO fine particle in a plasticizer, and a vinyl resin.

[Claim(s)]
[Claim 1] The solar radiation cover glass laminate which makes the interlayer who has the solar radiation cover function characterized by providing the following come to intervene between two sheet glass. The aforementioned interlayer is the addition liquid which made the plasticizer distribute at least one sort of 6 boride particles chosen from the group which consists of LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, LuB6, B6 (La, Ce), and SrB6 and CaB6. Vinyl system resin.
[Claim 2] The solar radiation cover glass laminate which makes the interlayer who has the solar radiation cover function characterized by providing the following come to intervene between two sheet glass. The aforementioned interlayer is the addition liquid which made at least one sort of 6 boride particles chosen from the group which consists of LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, LuB6, B6 (La, Ce), and SrB6 and CaB6, and the row distribute an ITO particle and/or an ATO particle to a plasticizer. Vinyl system resin.
[Claim 3] The glass laminate for solar radiation cover according to claim 2 characterized by making the weight ratio of the aforementioned 6 boride particle, and the aforementioned ITO particle and/or an ATO particle into the range of 0.1:99.9-90:10.
[Claim 4] The glass laminate for solar radiation cover of the claim 1-3 to which the aforementioned plasticizer is characterized by being triethylene glycol di-2-ethyl butyrate given in any 1 term.
[Claim 5] It is the solar radiation cover glass laminate which makes the interlayer who has a solar radiation cover function come to intervene between two sheet glass. the aforementioned interlayer it forms in the field located inside one [at least] sheet glass -- having -- LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, and LuB6 (it La(s)) [and] Ce) The solar radiation cover film which applied the application liquid which contains at least one sort of 6 boride particles chosen from the group which consists of B6, and SrB6 and CaB6 as a solar radiation cover component, and was formed, The glass laminate for solar radiation cover characterized by being formed of the interlayer containing the vinyl system resin which intervenes between two aforementioned sheet glass.
[Claim 6] It is the solar radiation cover glass laminate which makes the interlayer who has a solar radiation cover function come to intervene between two sheet glass. the aforementioned interlayer it forms in the field located inside one [at least] sheet glass -- having -- LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, and LuB6 (it La(s)) [and] Ce) At least one sort of 6 boride particles chosen from the group which consists of B6, and SrB6 and CaB6, The glass laminate for solar radiation cover characterized by being formed of the solar radiation cover film which applied the application liquid which contains one or more sorts in an ITO particle and an ATO particle as a solar radiation cover component, and was formed, and the interlayer containing the vinyl system resin which intervenes between two aforementioned sheet glass.
[Claim 7] The glass laminate for solar radiation cover according to claim 5 or 6 characterized by the aforementioned interlayer having a solar radiation cover function.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the glass laminate for solar radiation cover used as the safety glass for vehicles, such as an automobile, a windowpane of a building, etc.
[0002]
[Description of the Prior Art] The solar energy which puts a solar radiation cover film and enters from glass between sheet glass as safety glass for [conventional] automobiles etc. is intercepted, and the thing aiming at mitigation of the feeling of **** of a cooling load or a man is proposed.
[0003] The solar energy which puts a solar radiation cover film and enters from glass between sheet glass as safety glass for [conventional] automobiles etc. is intercepted, and the thing aiming at mitigation of the feeling of **** of a cooling load or a man is proposed. For example, according to JP,8-217500,A, this glass laminate makes the elasticity resin layer containing the heat ray cover nature metallic oxide which consists of the tin oxide or indium oxide 0.1 micrometers or less of a detailed particle size intervene between the sheet glass of a couple, and is constituted. Moreover, the glass laminate which prepared and constituted the interlayer who distributed the metal of Sn, Ti, Si, Zn, Zr, Fe, aluminum, Cr, Co, Ce, In, nickel, Ag, Cu, Pt, Mn, Ta, W, V, and Mo, an oxide, a nitride, a sulfide, the dope objects of Sb or F, or these composites between at least two sheet glass is indicated by JP,8-259279,A. Furthermore, the windowpane for automobiles which made the glass component nature which consists of the ultrafine particle, the organic silicon, or organic silicon compound which consists of TiO2, ZrO2, SnO2, and In 2O2 intervene between transparent plate-like part material is indicated by JP,4-16004,A. To JP,10-297945,A further again between the transparent glass-plate-like objects of at least two sheets The interlayer who consists of three layers is prepared. to the interlayer of the 2nd layer, among interlayers Sn, Ti, Si, Zn, Zr, Fe, aluminum, Cr, Co, In, nickel, Ag, The glass laminate which distributed the metal of Cu, Pt, Mn, Ta, W, V, and Mo, an oxide, a nitride, a sulfide, the dope objects of Sb or F, or these composites, and used the interlayer of the 1st layer and the 3rd layer as the resin layer is described.
[0004]
[Problem(s) to be Solved by the Invention] However, the glass laminate concerning the Prior art indicated by these official reports had neither Japanese ****** nor an enough visible light-transmission performance, and the improvement was called for. this invention aims at offering the solar radiation cover glass laminate which raises a solar radiation cover function and has the penetrable high ability of a light field.
[0005]
[Means for Solving the Problem] The result to which this invention persons examined many things about the interlayer who consists of the interlayer or this interlayer which intervenes between two sheet glass, and a solar radiation cover film in order to attain the above-mentioned purpose, This is ultrafine-particle-ized paying attention to 6 boride particle which holds a free electron so much. While producing the addition liquid which it comes to distribute to a plasticizer with ITO or an ATO particle according to a request,

fabricating the vinyl system resin constituent which added this addition liquid to the vinyl system resin in the shape of a sheet and forming an interlayer The glass of two sheets which applied the application liquid which puts the interlayer formed in the shape of [aforementioned] a sheet between two sheet glass, or has a solar radiation cover function inside, Or two sheet glass which applied one sheet glass and the application liquid which has a solar radiation cover function inside, and formed the solar radiation cover film, A certain interlayer which it was and was formed as mentioned above between one sheet glass and other one usual sheet glass, Or by producing the glass laminate for solar radiation cover by the method of putting the conventional interlayer which added the plasticizer to the vinyl system resin and was fabricated in the shape of a sheet, and making it into an interlayer While this glass laminate for solar radiation cover had the maximum of permeability in the light field, it finds out discovering absorption strong against a near infrared region, and having the minimum of permeability, and came to complete this invention.

[0006] Namely, the glass laminate for solar radiation cover concerning the 1st embodiment of this invention It is the solar radiation cover glass laminate which makes the interlayer who has a solar radiation cover function come to intervene between two sheet glass. the aforementioned interlayer LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, LuB6 (it La(s)), Ce) It is characterized by being formed of the interlayer which consists of addition liquid which made the plasticizer distribute at least one sort of 6 boride particles chosen from the group which consists of B6, and SrB6 and CaB6, and a vinyl system resin.

[0007] Moreover, the glass laminate for solar radiation cover concerning the 2nd embodiment of this invention It is the solar radiation cover glass laminate which makes the interlayer who has a solar radiation cover function come to intervene between two sheet glass. the aforementioned interlayer LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, LuB6 (it La(s)), Ce) At least one sort of 6 boride particles chosen from the group which consists of B6, and SrB6 and CaB6, and addition liquid which made the row distribute an ITO particle and/or an ATO particle to a plasticizer, It is characterized by being characterized by being formed of the interlayer which consists of a vinyl system resin, and making the weight ratio of the aforementioned 6 boride particle, and the aforementioned ITO particle and/or an ATO particle into the range of 0.1:99.9-90:10.

[0008] And in the 1st embodiment of the aforementioned this invention, and the 2nd embodiment, the aforementioned plasticizer is triethylene glycol di-2-ethyl butyrate.

[0009] The glass laminate for solar radiation cover which furthermore starts the 3rd embodiment of this invention It is the solar radiation cover glass laminate which makes the interlayer who has a solar radiation cover function come to intervene between two sheet glass. the aforementioned interlayer it forms in the field located inside one [at least] sheet glass -- having -- LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, and LuB6 (it La(s)) [and] Ce) The solar radiation cover film which applied the application liquid which contains at least one sort of 6 boride particles chosen from the group which consists of B6, and SrB6 and CaB6 as a solar radiation cover component, and was formed, It is characterized by being formed of the interlayer containing the vinyl system resin which intervenes between two aforementioned sheet glass.

[0010] The glass laminate for solar radiation cover which starts the 4th embodiment of this invention further again It is the solar radiation cover glass laminate which makes the interlayer who has a solar radiation cover function come to intervene between two sheet glass. the aforementioned interlayer it forms in the field located inside one [at least] sheet glass -- having -- LaB6, CeB6, PrB6, NdB6, GdB6, TbB6, DyB6, HoB6, YB6, SmB6, EuB6, ErB6, TmB6, YbB6, and LuB6 (it La(s)) [and] Ce) At least one sort of 6 boride particles chosen from the group which consists of B6, and SrB6 and CaB6, It is characterized by being formed of the solar radiation cover film which applied the application liquid which contains one or more sorts in an ITO particle and an ATO particle as a solar radiation cover component, and was formed, and the interlayer containing the vinyl system resin which intervenes between two aforementioned sheet glass.
[0011] And in the 3rd of the aforementioned this invention, and the 4th embodiment, it is desirable that the aforementioned interlayer has a solar radiation cover function.
[0012]
[Embodiments of the Invention] In this invention, the following shall be first included as an interlayer's gestalt.
** The interlayer who consists only of an interlayer which consists of a vinyl system resin constituent which comes to add the addition liquid which made the plasticizer distribute a solar radiation cover component to a vinyl system resin while intervening between two sheet glass and sticking both sheet glass.
** The interlayer who consists of a solar radiation cover film which applied the application liquid which comes to add a binder in the addition liquid which was formed in the field located inside one [at least] sheet glass, and was distributed by the plasticizer in the solar radiation cover component, and was formed, and an interlayer which consists of the aforementioned vinyl system resin constituent which intervenes between two sheet glass and sticks.
** The interlayer who consists of the conventional interlayer which comes to add a plasticizer to the vinyl system resin which intervenes between the solar radiation cover film applied and formed and two sheet glass, and sticks the application liquid which comes to add a binder to the addition liquid which was formed in the field located inside one [at least] sheet glass, and was distributed by the plasticizer in the solar radiation cover component.
[0013] The addition liquid used for the solar radiation cover glass laminate of this invention next distributes uniformly 6 boride particle, 6 boride particle, an ITO (tin content indium oxide) particle and 6 boride particle, the ATO (antimony content tin oxide) particle or 6 boride particle, ITO particle, and ATO particle as a solar radiation cover component into the mixed liquor of a plasticizer and a solvent, and is produced.
[0014] and as a 6 boride particle used for this invention 6 hoe-ized lanthanum (LaB6), 6 hoe-ized cerium (CeB6), 6 hoe-ized praseodymium (PrB6), 6 hoe-ized neodymium (NdB6), 6 HOU-ized gadolinium (GdB6), 6 hoe-ized terbium (TbB6), 6 hoe-ized dysprosium (DyB6), 6 HOU-ized holmium (HoB6), 6 HOU-ized yttrium (YB6), 6 HOU-ized samarium (SmB6), 6 HOU-ized europium (EuB6), 6 hoe-ized erbium (ErB6), 6 HOU-ized thulium (TmB6), 6 hoe-ized ytterbium (YbB6), 6 hoe-ized lutetium (LuB6), The particle of 6 hoe-ized lanthanum cerium (La, Ce) (B6), 6 hoe-ized strontium (SrB6), and 6 HOU-ized calcium (CaB6) or the particle of such mixture is mentioned as the

typical thing.
[0015] Moreover, although it is desirable that the front face has not oxidized as a 6 boride particle used for this invention, it is not avoided to some extent that have usually oxidized in many cases slightly, and surface oxidization takes place at the distributed process of a particle. However, the effectiveness which discovers a solar radiation shielding effect also by that case is not affected at all.
[0016] Furthermore, although such a large solar radiation shielding effect that the integrity as a crystal is high is obtained, these 6 boride particles can discover a solar radiation shielding effect, if the fundamental combination inside a particle consists of combination of each metal and boron even if it seems that crystallinity produces a diffraction peak [low and broadcloth in an X diffraction].
[0017] Although visible light-transmission nature arises on an interlayer or a solar radiation cover film in the state where particle size distributed in the interlayer or the solar radiation cover film sufficiently small compared with visible light wave length although these 6 boride particles were the powder colored ashes black, tea black, green black, etc., infrared light cover ability can be held sufficiently strongly. the absorbed energy of the indirect transition between bands according [although this reason is not made clear in detail, there are many amounts of the free electron in these particles and] to the free electron of the interior of a particle, and a front face -- just -- visible - since it is in the near-infrared neighborhood, it is thought that the heat ray of this wavelength field is reflected and absorbed alternatively By the film which distributed these particles sufficiently finely and uniformly according to the experiment, while permeability is the wavelength of 400nm - 700nm, it has the maximal value, and it has the minimal value with a wavelength of 700nm - 1800nm in between, and it is observed that the difference of the maximal value and the minimal value of these permeability is 15 points or more further. If visible light wave length takes into consideration that it is 380nm - 780nm, and visibility is campanulate [with a peak of near 550nm], by such film, the light will be penetrated effectively, and the other heat ray will be reflected and absorbed effectively.
[0018] The ITO particle and ATO particle which are used by this invention next, combining with 6 boride particle have large reflection and absorption which reflection and absorption of light are not almost in a light field, and originates in plasma resonance in a field 1000nm or more. The lower right serves as ** as these transparency profiles go to a long wavelength side by the near infrared region.
[0019] On the other hand, the transparency profile of 6 borides has a bottom near 1000nm, and shows an upward slant to the right gradually by the long wavelength side from it. for this reason, by using 6 borides, and ITO and ATO together, a visible light transmittance becomes possible [covering the sunrays of a near infrared region], without making it decrease, and is independent respectively in an ITO particle or an ATO particle -- or a solar radiation cover property can be raised rather than it combines and uses it
[0020] Moreover, the solar radiation cover capacity per unit weight of 6 borides is very high, and demonstrates the effect by the 1/10 or less amount used as compared with ITO or ATO. By furthermore using together with ITO or ATO, since only a solar radiation cover property can be raised further, maintaining a fixed visible light transmittance, cost is also reducible. Moreover, since the amount of all the particles used is sharply reducible, it becomes possible to raise the abrasion strength and weatherability of an interlayer or a solar radiation cover film.

[0021] Since a light field has absorption when further 6 boride increases the amount used, by controlling the addition, it can control absorption of a light field freely and can also perform application of luminosity adjustment, privacy protection, etc.
[0022] And as for the particle size of 6 boride particle to be used, it is desirable to be referred to as 200nm or less, and it sets it to 100nm or less more preferably. A particle with a larger mean particle diameter than 200nm or the condensed big and rough particle is because it becomes the source of light scattering of the interlayer who consists of the fabricated interlayer or the applied solar radiation cover film and this interlayer blooms cloudy.
[0023] Moreover, an ITO particle and an ATO particle are also desirable and being referred to as 200nm or less by the same reason as the above sets them to 100nm or less more preferably.
[0024] And if it is desirable that it is the range of 0.1:99.9-90:10 as for the weight ratio of 6 boride particle, and an ITO particle and/or an ATO particle and there are few 6 boride particles than this weight ratio range, the amount of all the particles used is seldom irreducible, the Kos ****** effect will be small and a solar radiation cover property will also become bad. On the other hand, even if there are more 6 boride particles than the aforementioned weight ratio range, a solar radiation cover property becomes bad.
[0025] Although the method of distributing the aforementioned particle to a solvent can be arbitrarily chosen if it is a method which a particle distributes in a solvent uniformly, as an example, methods, such as a bead mill, a ball mill, a sand mill, and ultrasonic distribution, can be mentioned, and the addition liquid for an interlayer or solar radiation cover films which uses the aforementioned particle as a solar radiation cover glass laminate of this invention by distributing to a solvent will be produced.
[0026] In addition, especially the solvent for adding the aforementioned particle and distributing in the aforementioned addition liquid, is not what is limited. It is possible to choose according to the vinyl system resin blended in case the conditions and vinyl system resin constituent which form an interlayer and a solar radiation cover film are prepared. For example, a dioctyl phthalate, a dibutyl phthalate, diisobutyl phthalate, Adipic-acid-G 2-ethylhexyl, a diisodecyl adipate, epoxy fatty acid monoester, Triethylene glycol di-2-ethyl butyrate, triethylene-glycol-G 2-ethylhexoate, Plasticizers, such as a dibutyl sebacate and dibutyl sebacate, can be mentioned, and the various kinds of general organic solvents, such as alcohol, the ether, ester, and a ketone, are also usable. Moreover, an acid and alkali may be added if needed and pH may be adjusted.
[0027] In case [in which the aforementioned vinyl system resin constituent is furthermore prepared] it hits and the aforementioned particle is made to contain in a vinyl system resin, in order to raise the distributed stability further, it is also possible to add the following plasticizer and various kinds of surfactants, a coupling agent, etc.
[0028] And it is not limited especially as a plasticizer added by the aforementioned vinyl system resin, for example, dioctyl-phthalate, dibutyl-phthalate, diisobutyl phthalate, and adipic-acid-G 2-ethylhexyl, a diisodecyl adipate, epoxy fatty-acid-monoester triethylene-glycol-G 2-ethyl butyrate, triethylene-glycol-G 2-ethylhexoate, a dibutyl sebacate, dibutyl sebacate, etc. are mentioned.
[0029] As a vinyl system resin used when preparing a vinyl system resin constituent using the addition liquid which is furthermore the above, and was made and prepared For example, a polyvinyl-butyral, polyvinyl chloride, and vinyl chloride-ethylene copolymer,

A vinyl chloride-ethylene-glycidyl methacrylate copolymer, a vinyl chloride-ethylene-glycidyl acrylate copolymer, A vinyl chloride-glycidyl methacrylate copolymer, a vinyl chloride-glycidyl acrylate copolymer, A polyvinylidene chloride and vinylidene-chloride-acrylonitrile copolymer, a polyvinyl acetate ethylene vinylacetate copolymer, polyvinyl-acetal-polyvinyl-butyral mixture, etc. are mentioned. Especially a polyvinyl butyral is desirable.

[0030] A well-known method is used for the formation method of the interlayer which next starts this invention, for example, the calendering-roll method, an extrusion method, the casting method, a tubular film process, etc. can be used. When using the interlayer which consists of a vinyl system resin constituent as an interlayer for solar radiation cover glass laminates of this invention especially, this vinyl system resin constituent can add and knead the aforementioned addition liquid to a vinyl system resin, and can fabricate the vinyl system resin constituent which a particle comes to distribute uniformly and was prepared in this way in the shape of a sheet. In case a vinyl system resin constituent is fabricated in the shape of a sheet, in order to blend a thermostabilizer, an antioxidant, etc. if needed and to raise the penetration of a sheet, you may blend an adhesive strength regulator (for example, metal salt).

[0031] To moreover, the field located inside [one / at least] two aforementioned sheet glass which constitutes the glass laminate for solar radiation cover The application liquid which makes binders, such as an ethyl silicate, come to distribute 6 boride particle as a solar radiation cover component is applied. form a solar radiation cover film or as a solar radiation cover component 6 boride particle, Apply the application liquid which makes the aforementioned binder come to distribute one or more sorts in an ITO particle and an ATO particle, and a solar radiation cover film is formed. Subsequently, among both sheet glass, the interlayer of the shape of a sheet which consists of the conventional interlayer or the aforementioned vinyl system resin constituent which added the plasticizer to the vinyl system resin and fabricated softening and the thing which liquefied in the shape of a sheet is made to be able to intervene, it can be made to be able to stick, and the glass laminate for solar radiation cover can also be formed.

[0032] Thus, according to this invention, the addition liquid which contains 6 boride particle as a solar radiation cover component is added to a vinyl system resin. The interlayer which fabricated the vinyl system resin constituent which furthermore added the plasticizer, was distributed uniformly and prepared in the shape of a sheet is used. produce a glass laminate or Or apply the application liquid which comes to add a binder in the aforementioned addition liquid to the field located inside [one / at least] two sheet glass, and a solar radiation cover film is formed. It becomes possible to offer the glass laminate for solar radiation cover which has a solar radiation cover function, without using the physical forming-membranes method and the complicated process of the high cost in producing a glass laminate using the interlayer or the conventional interlayer which consists of the aforementioned vinyl system resin constituent, and has the penetrable high ability of a light region.

[0033] Moreover, 6 boride particle which has absorption strong against a near infrared region as a solar radiation cover component, The interlayer which fabricated the vinyl system resin constituent which added the addition liquid which used together the ATO particle and/or the ITO particle, and was prepared to the vinyl system resin, added the plasticizer further, was distributed uniformly, and was prepared in the shape of a sheet is

used. produce a glass laminate or Or apply the application liquid which comes to add a binder in the aforementioned addition liquid to the field located inside [one / at least] two sheet glass, and a solar radiation cover film is formed. Or a solar radiation cover property is raised rather than it combines and uses it. producing a glass laminate using the interlayer or the conventional interlayer which consists of the aforementioned vinyl system resin constituent -- ATO and ITO -- independent in each particle -- The amount of the ATO particle at the time of production of an interlayer or a solar radiation cover film or the ITO particle used is decreased, and it also becomes possible to reduce material cost.

[0034]

[Example] The example of this invention is explained with the example of comparison below.

[0035] (Example 1) Proper quantity mixture of 20g [of LaB6 particles of 67nm of mean particle diameters] and diacetone alcohol (DAA) 50g, triethylene-glycol-di-2-ethyl-butyrate 20g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which LaB6 particle distributed was produced (A liquid).

[0036] On the other hand, proper quantity mixture of 20g [of ITO particles of 80nm of mean particle diameters] and triethylene-glycol-di-2-ethyl-butyrate 70g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which the ITO particle distributed was produced (B liquid).

[0037] The addition liquid for interlayers which mixed and prepared A liquid and B liquid was added to the polyvinyl butyral, triethylene glycol di-2-ethyl butyrate was added as a plasticizer, and 0.61% of the weight, ITO concentration prepared the vinyl system resin constituent so that 0.0038 % of the weight and polyvinyl-butyral concentration might become [LaB6 concentration] 70 % of the weight.

[0038] This vinyl system resin constituent was kneaded with a roll, it fabricated in the shape of [of 0.76mm **] a sheet, and the interlayer was produced. This interlayer was put between two transparent float glasses with a thickness of 2.5mm, after heating at 80 degrees C and carrying out temporary adhesion, the autoclave of 140 degrees C and 14 kg/cm2 performed this adhesion, and the glass laminate was produced.

[0039] It measures using the Hitachi spectrophotometer and the spectral characteristic of the produced glass laminate is JIS. R 3106 is followed and they are solar radiation permeability and JIS. R A visible light transmittance is computed according to 3211, and the result is shown in Table 1.

[0040] Moreover, as a result of measuring a pan mel value in the following way about the produced glass laminate, the pan mel value was 5 and the adhesion of sheet glass and an interlayer was enough. Pan mel examination: It ground until it applied to the hammer (portion of the head is 1pound) pulverization testing machine and the covering glass particle diameter was set to a maximum of 6mm or less, after keeping the glass laminate at -18 degrees C for 1 hour or more and making it constant temperature. The broken piece of glass was shaken off and the portion which the interlayer exposed was divided into the rank of 0-8, and it judged with a value becoming large, so that the degree of exposure was low. It is the test method which judges whether this has the adhesion force of sheet glass and an interlayer within the limits of predetermined, and the value has desirable

within the limits of 3-6. It is easy to exfoliate or less in one, and, on the other hand, penetration-proof becomes small or more by eight.

[0041] (Examples 2-5) The vinyl system resin constituent was prepared so that it might become composition of Table 1 about A liquid, B liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0042] (Example 6) The vinyl system resin constituent was prepared so that it might become composition of Table 1 about A liquid, the poly BIERU butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0043] (Example 1 of comparison) The vinyl system resin constituent was prepared so that it might become composition of Table 1 about B liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0044] Composition of the example 1 of comparison and examples 1-5 and change of an optical property are shown in drawing 1 below. It became possible from drawing 1 to decrease solar radiation permeability further, without lowering a visible light transmittance compared with the property of the conventional ITO by carrying out minute amount addition of the LaB6 particle very much, and it turns out at this time that the amount of ITO particles is sharply reducible. For example, if the example 1 of comparison is compared with an example 2, by having added LaB6 particle 1.38% of the weight to all the particles in an interlayer, a visible light transmittance can lower solar radiation permeability three points or more, maintaining to 78%, and can mitigate an ITO addition below in a half further. It was clearer than this that cost reduction can be further performed simultaneously with improvement in a solar radiation cover property by minute amount addition of LaB6 particle.

[0045] (Example 2 of comparison) The proper quantity was mixed, ball mill mixture of 20g [of ATO particles of 55nm of mean particle diameters] and triethylene-glycol-di-2-ethyl-butyrate 70g, water, and the dispersant was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which the ATO particle distributed was produced (C liquid).

[0046] The vinyl system resin constituent was prepared so that it might become composition of Table 1 about C liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0047] (Examples 7-10) The vinyl system resin constituent was prepared so that it might become composition of Table 1 about A liquid, C liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0048] Composition of the example 2 of comparison and examples 7-10 and change of an optical property are shown in drawing 2 below. It became possible to decrease solar

radiation permeability further, without lowering a visible light transmittance compared with the property of the conventional ATO by carrying out minute amount addition of the LaB6 particle very much from drawing 2 . Moreover, it turns out at this time that the amount of ATO particles is sharply reducible. For example, when the example 2 of comparison was compared with the example 8, maintaining a visible light transmittance to 78% by having added LaB6 particle 10.71% of the weight to all the particles in an interlayer, solar radiation permeability could be lowered about two points, and it turns out further that an ATO addition is reducible 60% or more.

[0049] (Example 11) Proper quantity mixture of 20g [of CeB6 particles of 85nm of mean particle diameters] and diacetone alcohol (DAA) 50g, triethylene-glycol-di-2-ethyl-butyrate 20g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which CeB6 particle distributed was produced (D liquid).

[0050] The vinyl system resin constituent was prepared so that it might become composition of Table 1 about D liquid, B liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0051] (Example 12) Proper quantity mixture of 20g [of PrB6 particles of 85nm of mean particle diameters] and diacetone alcohol (DAA) 50g, triethylene-glycol-di-2-ethyl-butyrate 20g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which PrB6 particle distributed was produced (E liquid).

[0052] The vinyl system resin constituent was prepared so that it might become composition of Table 1 about E liquid, B liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0053] (Example 13) Proper quantity mixture of 20g [of NdB6 particles of 85nm of mean particle diameters] and diacetone alcohol (DAA) 50g, triethylene-glycol-di-2-ethyl-butyrate 20g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which NdB6 particle distributed was produced (F liquid).

[0054] The vinyl system resin constituent was prepared so that it might become composition of Table 1 about F liquid, C liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0055] (Example 14) Proper quantity mixture of 20g [of GdB6 particles of 85nm of mean particle diameters] and diacetone alcohol (DAA) 50g, triethylene-glycol-di-2-ethyl-butyrate 20g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which GdB6 particle distributed was produced (G liquid).

[0056] The vinyl system resin constituent was prepared so that it might become composition of Table 1 about G liquid, C liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an

example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0057] (Example 15) Proper quantity mixture of 20g [of YB6 particles of 85nm of mean particle diameters] and diacetone alcohol (DAA) 50g, triethylene-glycol-di-2-ethyl-butyrate 20g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which YB6 particle distributed was produced (H liquid).

[0058] The vinyl system resin constituent was prepared so that it might become composition of Table 1 about H liquid, B liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0059] (Example 16) Proper quantity mixture of 20g [of SmB6 particles of 85nm of mean particle diameters] and diacetone alcohol (DAA) 50g, triethylene-glycol-di-2-ethyl-butyrate 20g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which SmB6 particle distributed was produced (I liquid).

[0060] The vinyl system resin constituent was prepared so that it might become composition of Table 1 about I liquid, C liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0061] (Example 17) Optimum dose mixture of 20g [of EuB6 particles of 85nm of mean particle diameters] and diacetone alcohol (DAA) 50g, triethylene-glycol-di-2-ethyl-butyrate 20g, water, and the dispersant was carried out, ball mill mixture was carried out for 100 hours using the zirconia ball with a diameter of 4mm, and 100g of addition liquid for interlayers which EuB6 particle distributed was produced (J liquid).

[0062] The vinyl system resin constituent was prepared so that it might become composition of Table 1 about J liquid, C liquid, a polyvinyl butyral, and triethylene glycol di-2-ethyl butyrate. The interlayer was produced for this by the same method as an example 1, and the target glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 1.

[0063]

[Table 1]

	ビニル系樹脂組成物					光学特性	
	6ホウ化物		ITO	ATO	ポリビニルブチラール	可視光	日射透
	種類	濃度 (%)	濃度 (%)	濃度 (%)	濃度 (%)	過率透 (%)	過率 (%)
実施例1	LaB_6	0.0038	0.61	0	70	78	55.6
実施例2	LaB_6	0.0051	0.36	0	70	78	54.2
実施例3	LaB_6	0.0072	0.32	0	70	78	54.7
実施例4	LaB_6	0.0086	0.26	0	70	78	57.5
実施例5	LaB_6	0.014	0.12	0	70	78	59.3
実施例6	LaB_6	0.020	0	0	70	78	59.7
比較例1	LaB_6	0	0.72	0	70	78	57.8
比較例2	LaB_6	0	0	0.41	70	78	63.1
実施例7	LaB_6	0.0038	0	0.34	70	78	62.5
実施例8	LaB_6	0.011	0	0.18	70	78	61.3
実施例9	LaB_6	0.016	0	0.13	70	78	61.0
実施例10	LaB_6	0.016	0	0.099	70	78	62.0
実施例11	CeB_6	0.0079	0.33	0	70	77	53.8
実施例12	PrB_6	0.0086	0.32	0	70	77	54.1
実施例13	NdB_6	0.0099	0	0.18	70	78	62.1
実施例14	GdB_6	0.011	0	0.19	70	78	61.9
実施例15	YB_6	0.0072	0.29	0	70	78	54.0
実施例16	SmB_6	0.016	0	0.13	70	77	61.5
実施例17	EuB_6	0.0016	0	0.12	70	77	61.8

[0064] (Example 18) The ethyl-silicate solution which prepared the ethyl silicate 40 (the Tama chemical-industry incorporated company make : tradename) which are 4 - a pentamer with average degree of polymerization by 10g, ethanol 27g, 8g of 5% hydrochloric-acid solution, and 5g of water was mixed and agitated well, and 50g of ethyl-silicate mixed liquor was prepared (K liquid).

[0065] A liquid, B liquid, and K liquid were mixed, and it diluted with diacetone alcohol further, and 7.25% of the weight, ITO concentration produced the application liquid for

solar radiation cover films so that 0.045-% of the weight and SiO2 concentration might become [LaB6 concentration] 2.5 % of the weight. 15g of this application liquid was applied on the float glass with a thickness of 2.5mm by the spin coater, and it put into the 180-degree C electric furnace, and heated for 30 minutes, and the solar radiation cover glass which made the solar radiation cover film form on the aforementioned float glass was produced.

[0066] This solar radiation cover glass and the float glass with a thickness of 2.5mm were put by the 0.76mm polyvinyl-butyral film for interlayers, as the aforementioned solar radiation cover film faced inside, according to the usual glass laminate manufacturing method, heating and sticking by pressure of were done, and the glass laminate was produced.

[0067] The spectral characteristic of the produced glass laminate is measured like an example 1, solar radiation permeability and a visible light transmittance are computed, and it is shown in Table 2. Moreover, as a result of carrying out the pan mel examination same about the produced glass laminate as an example 1 and measuring a pan mel value, the pan mel value was 5 and the adhesion of sheet glass and an interlayer was enough.

[0068] (Examples 19-22) A liquid, B liquid, and K liquid were mixed, and the application liquid for solar radiation cover films was produced so that it might dilute with diacetone alcohol further and might become composition of Table 2. Solar radiation cover glass was produced by the same method as an example 18 using this application liquid, and the target glass laminate was produced using this. The optical property of this glass laminate is collectively shown in Table 2.

[0069] (Example 23) A liquid and K liquid were mixed, and the application liquid for solar radiation cover films was produced so that it might dilute with diacetone alcohol further and might become composition of Table 2. Solar radiation cover glass was produced by the same method as an example 18 using this application liquid, and the target glass laminate was produced using this. The optical property of this glass laminate is collectively shown in Table 2.

[0070] (Example 24) A liquid, B liquid, and K liquid were mixed, and it diluted with diacetone alcohol further, and 3.63% of the weight, ITO concentration produced the application liquid for solar radiation cover films so that 0.023-% of the weight and SiO2 concentration might become [LaB6 concentration] 1.25 % of the weight. Applied 15g of this application liquid on the float glass with a thickness of 2.5mm by the spin coater, put into the 180-degree C electric furnace, heated for 30 minutes, the solar radiation cover film was made to form on the aforementioned float glass, and solar radiation cover glass was produced.

[0071] On the other hand, in A liquid and B liquid, the polyvinyl butyral was mixed as a vinyl system resin, triethylene glycol di-2-ethyl butyrate was mixed as a plasticizer, and 0.0025% of the weight, 0.18-% of the weight and LaB6 concentration prepared the vinyl system resin constituent so that polyvinyl-butyral concentration might become 70 % of the weight, and ITO concentration produced the interlayer fabricated by the same method as an example 1.

[0072] And as the aforementioned solar radiation cover film faced the aforementioned solar radiation cover glass and the float glass with a thickness of 2.5mm inside, the aforementioned interlayer was put, according to the usual glass laminate manufacturing method, heating and sticking by pressure of were done, and the glass laminate was

produced. The optical property of this glass laminate is collectively shown in Table 2.
[0073] As a result of measuring a pan mel value about the produced glass laminate, the pan mel value was 5 and the adhesion of sheet glass and an interlayer was enough.
[0074] (Example 25) A liquid and K liquid were mixed and it diluted with diacetone alcohol further, and 0.24% of the weight, LaB6 concentration produced the application liquid for solar radiation cover films so that SiO2 concentration might become 1.25 % of the weight. Applied 15g of this application liquid on the float glass with a thickness of 2.5mm by the spin coater, put into the 180-degree C electric furnace, heated for 30 minutes, the solar radiation cover film was made to form on the aforementioned float glass, and solar radiation cover glass was produced.
[0075] On the other hand, in A liquid and B liquid, the polyvinyl butyral was mixed as a vinyl system resin, triethylene glycol di-2-ethyl butyrate was mixed as a plasticizer, and 0.0025% of the weight, 0.19-% of the weight and LaB6 concentration prepared the vinyl system resin constituent so that polyvinyl-butyral concentration might become 70 % of the weight, and ITO concentration produced the sheet-like interlayer fabricated by the same method as an example 1.
[0076] And as the aforementioned solar radiation cover film faced inside with the aforementioned solar radiation cover glass and the float glass with a thickness of 2.5mm, the aforementioned interlayer was put, according to the usual glass laminate manufacturing method, heating and sticking by pressure of were done, and the glass laminate was produced. The optical property of this glass laminate is collectively shown in Table 2.
[0077]
[Table 2]

	塗布液の組成					光学特性	
	6ホウ化物		ITO	ATO	SiO_2	可視光	日射透
	種類	濃度 (%)	濃度 (%)	濃度 (%)	濃度 (%)	過率透 (%)	過率 (%)
実施例18	LaB_6	0.045	7.25	0	2.5	78	55.7
実施例19	LaB_6	0.06	4.33	0	2.5	78	54.1
実施例20	LaB_6	0.09	3.84	0	2.5	78	54.5
実施例21	LaB_6	0.11	3.09	0	2.5	78	57.7
実施例22	LaB_6	0.17	1.38	0	2.5	78	59.4
実施例23	LaB_6	0.24	0	0	2.5	78	59.6
実施例24	LaB_6	0.023	3.63	0	1.25	78	58.0
実施例25	LaB_6	0.12	0	0	1.25	78	57.9

＊実施例18～23は通常合わせガラスに用いられる中間膜を使用し、実施例24、25は日射遮蔽成分を含有する中間膜を使用した。

[0078] In the glass laminate between which the interlayer for makeshift glass of two sheet glass intervenes as shown in each above example [whether the interlayer formed from the vinyl system resin constituent which adds the addition liquid which contains an ITO particle and/or an ATO particle according to 6 boride particle and a request to a vinyl system resin, and is prepared by the simple method is used without using the physical forming-membranes method of high cost, and] Or by applying the application liquid which comes to add a binder in the aforementioned addition liquid to the field which faces inside sheet glass, forming a solar radiation cover film, and subsequently making the aforementioned interlayer or the conventional interlayer intervene It became possible to manufacture the solar radiation cover glass laminate which has a solar radiation cover function and has penetrable high ability in a light region.

[0079]

[Effect of the Invention] In the solar radiation cover glass laminate which makes an interlayer come to intervene between two sheet glass as stated above according to this invention 6 boride particle and the interlayer formed from the vinyl system resin constituent which adds the addition liquid which contains an ITO particle and/or an ATO particle according to a request to a vinyl system resin, and is prepared, After applying the application liquid which comes to add the aforementioned addition liquid to a binder to the field which faces inside sheet glass and forming a solar radiation cover film, or by making the aforementioned interlayer or the conventional interlayer intervene It became

possible to manufacture very easily the solar radiation cover glass laminate which has a solar radiation cover function and has penetrable high ability in a light region by the simple method, without using the physical forming-membranes method of high cost.

[Translation done.]